IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of
Steven J. Fredette
Serial No.: 10/783,213
Filed: February 20, 2004
Title: Electric Storage Augmentation of Fuel Cell Response to AC System Transients

Docket No.: C-3126
Art Unit: 2836
Examiner: Christopher Jay Clark

DECLARATION UNDER 37 CFR 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Wesley E. Sedlacek, Jr. declare that:

1. I reside at 42 Daisy Lane, South Windsor, CT.

2. I have a Masters degree in Electrical Engineering and have been working in the field of fuel cells and related arts for over 5 years, and am currently engaged in that field on behalf of UTC Power Corporation, South Windsor, CT.

3. I have reviewed and familiarized myself with the above-identified subject application and relevant portions of Jungreis U.S. patent 6,304,006, Jungreis et al U.S. patent 6,134,124, Gyugyi et al U.S. patent 5,329,222, Hochgraf et al U.S. patent 6,794,844, and Early et al U.S. patent 4,961,151.

4. As understood, the premise of the rejection of claims 1 and 2 is that Jungreis be modified by first substituting a fuel cell with a DC/AC inverter (per Jungreis et al) for the auxiliary generator 18, and then going inside the UPS 12 to substitute a bidirectional DC/AC inverter (per Gyugyi et al) for the unidirectional DC/AC inverter A1.

5. While there is less than a complete description (and one misstatement) in Jungreis, an overall description of the Jungreis type of UPS having a "bypass switch" S1 is provided in Gyugyi et al, at column 2, lines 18-34. Note that the bypass switch is open unless

the power/inverter system fails. Then, the bypass switch closes to connect the grid directly to the load.

6. On the other hand, if the description in Jungreis (column 1, lines 29-42) is accepted as essentially correct, then Jungreis is the type described by Gyugyi et al at column 2, lines 35-49. Jungreis, column 1, lines 32 and 33: "Battery supplied UPSs provide backup power for short periods of time, typically on the order of minutes". At lines 41 and 42: "switch the UPS 12 input to the auxiliary generator output through S2." In this case, note that the bypass switch S1 in Jungreis would be normally closed, but in case of grid failure, it would be opened and the load could be transferred to the inverter A1. But ultimately, the bypass switch S1 must again close to transfer the load to the generator 18.

7. The presence of the "bypass switch" S1 in Jungreis, indicating a type of UPS in lines 18-24 of Gyugyi et al, is inconsistent with the description of Fig. 2 of Jungreis (column 1, lines 29-41), in which the grid is connected to the load unless the grid fails, then the grid is disconnected by S2 and the generator 18 takes over. To be consistent with the description of Figs. 2 and 3, Jungreis is this type of system, and the bypass switch S1 is initially open when the grid 10 fails.

8. The inverter A1 of Jungreis cannot connect to transformer T1 through rectifier DR1 because only half-waves will be conducted.

9. The statement, "the output of the inverter A1 can be switched to the main supply 10 in the event of a fault" is an unfortunate misstatement. If Jungreis' bypass switch S1 were closed, and the inverter A1 were connected to the grid 10 through the T2 primary for A1 and into the T2 primary for switch S1 (Jungreis, column 1, lines 18-23), the rectifier DR1 would be closing the power loop back to the input of inverter A1. This would result in half-cycles of power being bled off through rectifier DR1, resulting in an erratic, useless waveform at T1. Such a circuit arrangement would never be devised or intended by one skilled in electronics. Consistent with paragraph 6 hereinbefore, the statement was intended to mean "so that the output of inverter A1 can be switched to replace the main supply 10...."

10. In the subject application, lines 2-4 of claim 1 require that the fuel cell/primary DC/AC inverter provide power to three-phase power lines. In Jungreis, modifying Fig. 1 to add the generator 18 as in Fig. 3, it is clear that the switch S2 connects either the

grid 10 or the generator 18 through switch S2, to transformer T1. Paragraph 11 of the rejection identifies the "Three-phase power lines being coupled to the critical load (14) through switch S2 [Figure 3 of Jungreis 006]." To meet lines 2-4 of claim 1, the "three-phase power lines" must be from the generator 18 to the switch S2.

12. Lines 5-7 of claim 1 require the storage-DC/AC inverter be connectable "to said three-phase power lines...." That could only happen in Fig. 1 of Jungreis by passing power from inverter A1 through its T2 primary to the T2 primary of bypass switch S1, through bypass switch S1, backward through T1, and through S2. As described in paragraph 8 hereinbefore, such an arrangement is not viable.

13. In the subject application, lines 6-8 of claim 1 require that the storage-bidirectional DC/AC converter be "connectable...to said three-phase power lines" and require that the storage-bidirectional DC/AC converter "augment the response of said fuel cell power plant and said inverter...." The augmenting must take place on the "three-phase power lines" (claim 1, line 7). Therefore, claim 1 requires that the inverter and the converter be connected to the same three-phase lines. This cannot be achieved in Jungreis as modified by Jungreis et al and Gyugyi et al, as described in paragraphs 8 and 9 hereinbefore.

14. The disclosure of Gyugyi et al as it relates to the rejection of claims 1 and 2 is no more than a statement that bidirectional DC/AC converters are known in the art. There is no suggestion in Gyugyi et al that the DC/AC converter would be useful in an on-line UPS, such as UPS 12 in Jungreis. There is no motivation in Jungreis or Gyugyi et al for one of skill in electronics related to fuel cells to substitute the bidirectional inverter of Gyugyi et al for the DC-AC inverter A1 of Jungreis.

15. At column 2, lines 31-34, Gyugyi et al claim that one type of UPS is "not feasible for dynamic compensation of transient disturbances" on a line providing significant power. Column 2, lines 54 and 55 states that the other type of UPS allows "transients and harmonics to get to the load." And at column 2, lines 61-63, Gyugyi et al declare that the UPS philosophy is not acceptable to the utility environment. Thus, Gyugyi et al does not suggest combining its technology with the UPS philosophy disclosed in Jungreis.

16. A bidirectional DC/AC inverter connected in the circuit of Fig. 1 of Jungreis, at the place where inverter A1 is shown, would be expected to take AC power from T2 and

provide DC power to the DC bus 12-1. But, Jungreis teaches that DC power is provided to the bus by the rectifier DR-1. Taking power from the primary winding of T2 is not suggested anywhere nor would it work. One skilled in the electronics arts would therefore not make that substitution.

17. The modified disclosure of Jungreis Fig. 1 and Fig. 3 would not motivate anyone skilled in electronics related to fuel cells to provide apparatus according to claim 1 of the subject application, nor does Jungreis (as modified) suggest, to anyone skilled in electronics related fuel cells, any apparatus described in claim 1.

18. Gyugyi et al state at column 3, lines 57 and 58 that its system is "not required to provide full power to the line. And at column 4, lines 54 and 55, Gyugyi et al declare that "in the perspective of this invention, the distribution line is still supplying a percentage of normal power...." Gyugyi et al does not suggest to one skilled in electronics that a bi-directional DC/AC converter should be connected to avert lapses of power, as called for in claim 2 of the subject application.

19. As described in paragraphs 8 and 9 hereinbefore, the bidirectional DC/AC converter, substituted for Jungreis' inverter A1, cannot be connected to S2, and therefore is not connectable alternatively to the grid 10 or the three-phase lines (at the output of the generator 18, Fig. 3). Jungreis (as modified in the rejection) cannot meet the requirements of lines 4-5 of claim 3 of the subject application: connection to either the three-phase lines or the grid.

20. In Hochgraf et al, the diode 30 replaces the DC/DC converter 12, and carries the entire load of the fuel cell, all the time. Hochgraf et al does not suggest, to one skilled in electronics related to fuel cells, connecting a diode to bypass a primary DC/AC inverter (claim 1, lines 3 and 4 of the subject application) and a bi-directional DC/AC converter (claim 1, lines 6-8) that are connectable to the same three-phase lines (lines 4 and 7 of claim 1. Hochgraf et al and the other references do not suggest a mere diode in addition to complex converters and inverters. In the fuel cell and related arts, it would be unconventional to do so.

21. In Early et al, the switches 102, 104 serve to totally isolate the battery 101 or the fuel cell 103, respectively, from the rest of the system. The switch of claim 5 in the subject application does not isolate either the fuel cell or the storage; they are both

connectable through inverter and converter, respectively, to the three-phase lines (lines 4 and 7 of claim 1). The isolation switches 102, 104 do not suggest the combination of all the elements of claim 1 and claim 4, and a switch in series with a diode.

22. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

Wesley E. Sedlacek, JR. June 8, 2007

Wesley E. Sedlacek, Jr. Date